

Research on Optimization of Color Environment of Cruise Cabin

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Abstract:

As a relatively enclosed long-distance travel space, the light and color environment of the cruise cabin has a significant impact on the vision, physiology and psychology of tourists. In order to better understand the current status of color environment design for cruise ships, this article uses a solid spectrophotometer to collect color data for three types of spaces: the hall, restaurant, and living cabins of the Costa Venezia and uses the color structure (NCD) to collect color data. Based on the analysis of the color characteristics of the interior space, the relationship between interface color brightness and reflectivity, to obtain the optimization method for cruise ship color matching.

Keywords:

Color Environment, Cruise Interior Design, Hall, Dining Room, Living Cabin

1. Introduction

1.1. Development Situation of China's Cruise Market

The epidemic has had a great impact and impact on cruise companies around the world, including ports, destinations, service providers, tour operators, travel agencies, etc. According to the 2022 Cruise Outlook Report released by the International Cruise Lines Association (CLIA), the average passenger flow in Asia and China in 2018-2020 ranks second; 2022 is a key transition for the cruise industry, and it is expected to fully recover or even catch up with the epidemic in 2023 front level. According to the content of "Cruise Green Paper: China Cruise Industry Development Report (2021)", China has initially formed five cruise port groups radiating North Asia, Southeast Asia and other regions, laying a good foundation for the development of the cruise industry [5]. According to the national "Coastal Cruise Port Layout Plan", before 2030, 2 to 3 international cruise home ports will be formed in China, which will complement each other with cruise departure ports and cruise visiting ports, and build a more complete cruise port development layout [6].

The cruise ships operated in China are mainly American and European brands . In 2019, the Costa Venezia cruise ship entered Shanghai, one of the cruise home ports. The design of cruise ships reflects the historical traditions, cultural symbols, and

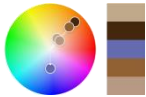
inheritance of technology and art of regions and countries, and is regarded as a maritime exhibit of cultural achievements. The color design of cruise ships operated in China mostly draws on the decoration style of foreign cruise ships, and less consideration is given to the localization and specialization of the light and color environment design of domestic cruise ships. In view of the above background, the team conducted a color survey on Costa's "Venice" cruise ship, in order to obtain the current status of the relevant color environment, and provide relevant design suggestions for China's localized cruise ship design.

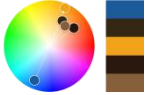
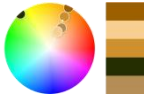
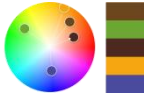
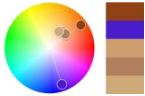
1.2. Current Situation of Cruise Color Environment Design

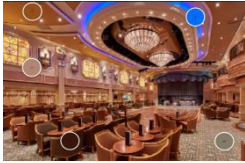
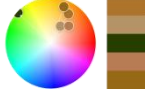
Cruise ships are considered to be "giant maritime mobile resort cities", which integrate complex functions such as residence, shopping, sightseeing, tourism, leisure, and entertainment. There are obvious differences in the brand building and interior theme design of different cruise ships [1]. For example, the Disney series of cruise ships mainly serve parent-child tourists. The color design is rich in colors, symbols and patterns are diversified, and the lighting color layout is bold. Disney animation stories are mostly used. The classic cartoon characters in the image are used as elements [8]. In addition, Zhou Hanxiang put forward relevant suggestions on how to simplify Chinese elements and apply them to key spaces of cruise ships; Li Zhen proposed intelligent design of light and color environment for cruise cabins. Temperature and information translation control the color temperature changes of different lights. For the color of decorative paintings, multi-physiological signal emotion recognition technology, facial expression recognition technology, and voice emotion recognition technology are mainly used to control the color changes of decorative paintings. The functions of different areas of the cruise ship are different. The selected colors will also be different. Designers need to choose colors based on ship functions and actual conditions to play the role of colors [7]. Satisfied with the humanized cabin color design to adjust the crew's psychology, stabilize the crew's emotions, and reduce the crew's work. pressure, thereby reducing the occurrence of accidents, and gave suggestions for different color schemes for the ceiling, walls and floors of the working cabin [2].

The following table analyzes the color environment of the key spaces of three popular cruise ships. Among them, China Merchants Yidun is the first self-operated high-end cruise ship in China after the epidemic; Zhiyin uses the Yangtze River as the carrier, and the whole ship is performing Theater; Cunard Queen Elizabeth is a five-star luxury cruise ship.

Table 1. Case analysis of color environment in cruise halls, restaurants, and living cabins.

Case information		Case image	Color matching method	Case light color analysis
Yidun Route: Shenzhen⇌ Xiamen⇌ Shenzhen; Shenzhen⇌ Sanya	hall			Color matching: similar color + contrasting color, the ceiling/wall/floor is mainly white or beige, the furniture is dark brown, and the blue table top is used as a contrasting color Color temperature control: warm color temperature

	Dining room			Color matching: similar color, the ceiling/wall is mainly light beige, the floor is yellow, the furniture is light beige, no embellishment color. Color temperature control: neutral color temperature
	cabin			Color matching: similar color + contrasting color, ceiling/wall is white, bedside wall skirt is blue wallpaper, floor gray-blue, furniture wood color, no embellishment color. Color temperature control: neutral color temperature
Zhiyin Route: Parked at Hankou River Beach	hall			Color matching: similar color + contrasting color, the ceiling/wall is dark brown, the central floor of the main hall is bright yellow pavement floor, decorated with blue floodlights. Color temperature selection control: warm color temperature + color projection (blue)
	Dining room			Color matching: similar color, the ceiling/wall is light color, the floor is dark yellow, and there are green plants in some parts. Color temperature selection control: warm color temperature + color projection
	cabin			Color matching: similar color + multi-color contrast, dark wood color for ceiling/wall/floor, blue light embellishment on curtains, bed surfaces and windows Color temperature selection control: warm color temperature + color projection (blue-purple)
Cunard Queen Elizabeth Route: Southampton, UK - Atlantic Canary Islands	hall			Color matching: similar color + contrasting color, the ceiling/wall/floor are warm beige, the sofa and local components are brown, and the ceiling is decorated with purple light. Color temperature control: warm color temperature +

				color cast light (purple)
	Dining room			Color matching: similar color + contrasting color, the ceiling/wall/seat is chestnut brown, the floor is light-colored carpet, and the ceiling is embellished with blue light. Color temperature selection control: warm color temperature + color projection (blue)
	cabin			Color matching: similar color, beige ceiling/wall, rotten leaf carpet on the ground, twilight for some components, and green plant embellishment for some parts. Color temperature control: warm color temperature

2. Methodology

2.1. Research space

The cruise space mainly includes public space and non-public space. The public space includes functions such as catering, entertainment, business, and medical care, and the service object is tourists; the non-public space includes crew working space and cabins, and the service object is tourists and cruise staff. The living cabins mainly include sunshine suites, standard sea view rooms, balcony rooms and interior cabins . In order to more comprehensively understand the color environment of tourists in public space and non-public space, this paper selects three functional spaces of lobby, restaurant and living cabin to conduct research.

2.2. Research equipment

The solid-state spectrophotometer measures the solid color and reflectance of the lighting environment of the cruise ship space. Solid color collection and record of reflectance, on the one hand, use digital color to judge the way of indoor color matching, on the other hand, the record of reflectance reflects the difference of brightness between different materials in the room and the impact on human eyes.

3. Results

3.1. Various spatial color impression coordinates

After the solid color measurement of the hall, dining room, and living cabin, and with the help of the color impression coordinate system of the Japan Color Research Institute (NCD) , the following four figures are obtained, which can be seen: 1) The background colors of the three types of spaces (ceiling, Walls and floors) are mainly

concentrated in the “VP” color wheel of the CS quadrant. The “VP” color wheel has high color brightness and low color saturation, which will not cause a certain impact on human vision and psychology; 2) The themes (wall skirts, furniture, etc.) and decorative colors (paintings, green plants, sculptures, etc.) of the three types of spaces are mainly concentrated in the areas near the color circles of “Gr”, “Dp” and “Dk” in the WH quadrant. The color brightness near p” and “Dk” is low, and the theme color chooses the color with slightly lower brightness to enrich the color level, but the embellishment color recommends the color in the WS quadrant. The lobby and dining room use similar color matching, and the living cabin adopts similar + contrasting colors. The blue sofa and wallpaper and the background color form a contrasting color effect, but the theme is relatively weak. It is recommended that blue be combined with elements such as the sea, seagulls, and sky to present a distinct color. Blue theme color design, etc.

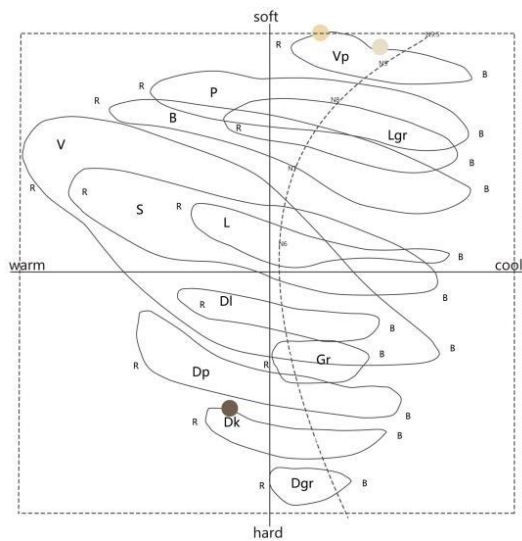


Figure 1. The color impression coordinates of the lobb.

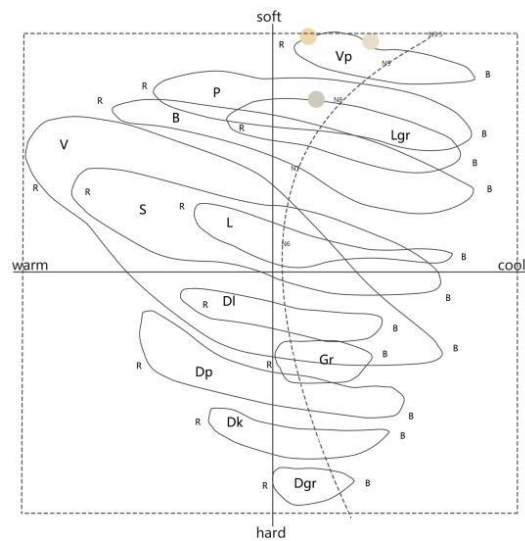


Figure 2. The color impression coordinates of the restaurant.

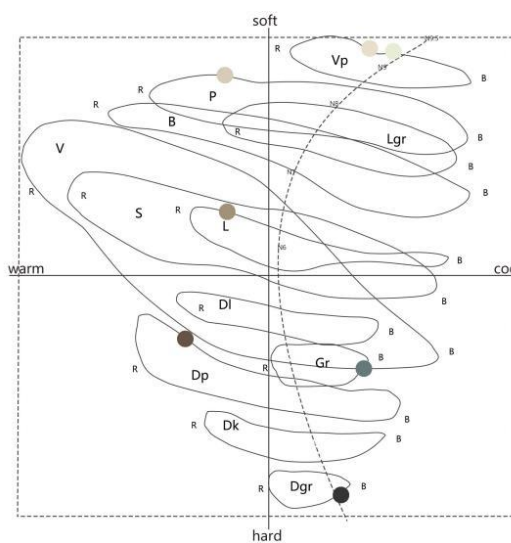


Figure 3. Color Impression Coordinates of the Living Cabin.

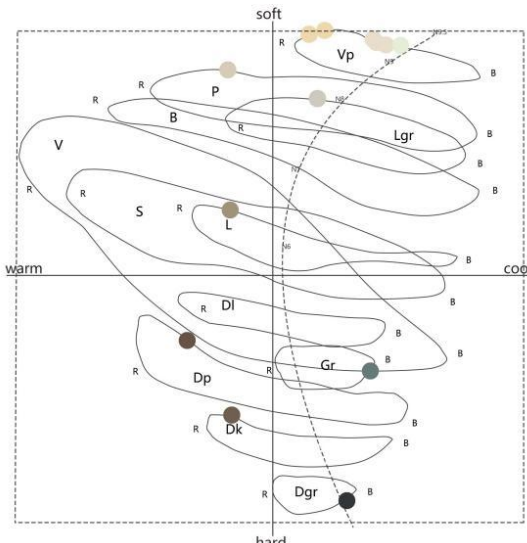


Figure 4. Color Impression Coordinates of the Above Three Spaces.

3.2. The relationship between color brightness and reflectivity of different spatial interfaces

The reflectivity and brightness of the three key interfaces of the hall, living cabin and dining room were compared and analyzed (Figure 6) , and it was found that the two trends were consistent . The above may have the following inspirations for the light and color design of the cabin: 1) When designing and controlling the visual brightness, the color brightness and reflectivity of the interface material should be considered at the same time. The higher the reflectivity, the higher the indoor visual brightness, and vice versa; 2) For the hall where the crowd gathers and disperses, the interface material with higher color brightness can be considered, which can enable users to quickly locate the space in the hall and find the purpose to be achieved 3) For dining rooms and living cabins, it is recommended to use interface materials with a slightly lower reflectivity and brightness . People have a long visual stay in such spaces . If materials with higher color brightness are used, uncomfortable glare may be easily caused.

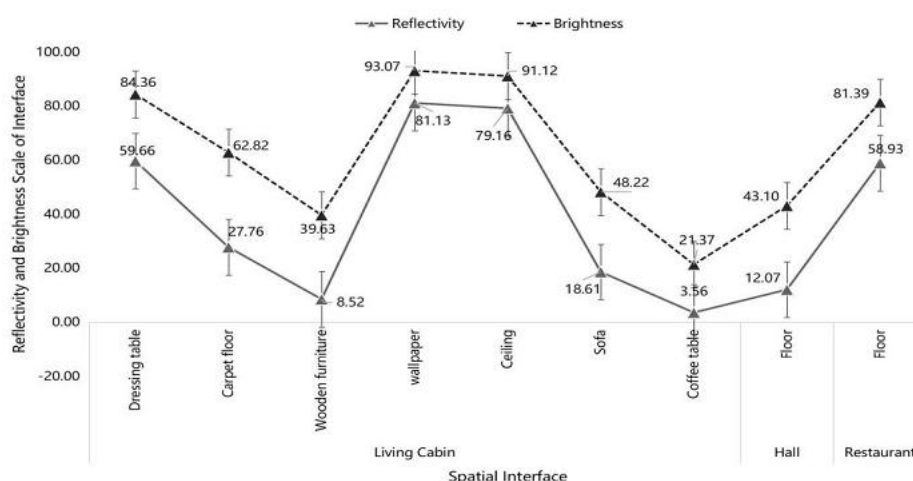


Figure 5. Line graph of lightness and reflectance of space- focused interface.

4. Conclusion and Suggestion

After analyzing the light and color of the key spaces (halls, restaurants, and living cabins) of many cruise ships at home and abroad, it is found that: 1) The color matching methods generally include approximate colors, approximate colors + contrasting colors; 2) The background (ceiling, wall, floor) is generally The same color is similar to the color, and the color hue is within 0-45°, that is, beige and light yellow; 3) The theme color is generally the color of furniture, wall skirts, and curtains, which is similar to the background or a contrasting color; 3) Contrasting color matching is generally a contrasting color between the embellishment color and the background and theme color. In the case of the investigation, the contrasting color is a blue light source or a solid color, and a purple light source.

The actual investigation of the light environment of Costa Cruises: 1) The cabin color is mainly concentrated in the area near the “VP” color circle of the CS quadrant and the “dp” color circle of the WH quadrant; 2) The color saturation of the “VP” color circle is low and not It will have a certain impact on people's vision and psychology, giving people a soft and light color perception; 3) The “dp” color circle involves space interfaces including furniture, corridor wall skirts and doors, and the

hall floor. The color brightness is low and the color vision is low. The area is large, and it is easy to give people a depressed and low visual experience;

1) Comprehensive design considerations for color temperature and multiple scenes

It is recommended that the color design of different spaces be combined with the space lighting to comprehensively consider the design, and it is recommended to increase the adjustable range of lighting color temperature to meet the functional, psychological and physiological needs of users in different time periods or different behaviors; for example, different lighting modes can be set in the cabin. , library and medical station recommend high color temperature to provide a lighting atmosphere for calm thinking and work. The restaurant continues to maintain the current color temperature of 2700K to create a comfortable and warm atmosphere, allowing users to relax and eat.

2) Background color hue and lightness design

Taking the color impression coordinate system of Japan Color Research Institute (NCD) as the reference for color selection control, it is recommended to use the colors in the VP color circle for the space background color of the hall, restaurant, and living cabin, with high color brightness and high color saturation. As a whole, it gives people a brighter, concise and refreshing color and visual psychological feeling; for the background wall of the restaurant, you can consider choosing yellow or orange with a slightly higher saturation, the color tone is warm and can promote people's appetite.

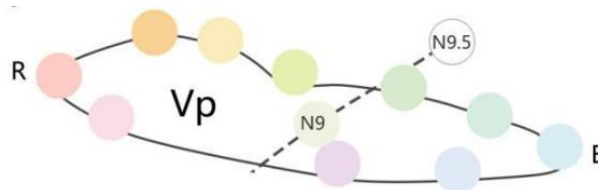


Figure 6. Background color hue and lightness design reference color circle.

3) Themed color of the lounge

The rest cabins are used by people of different ages, such as the elderly, adults, teenagers, and children. The elderly, women, and children can be considered to design cabin spaces with different themes. If the elderly are generally like warm colour, the theme colors can be considered in the Use colors with high brightness and saturation in special locations to improve the spatial perception and visual perception of the elderly; feminine colors such as pale pink and lavender can be considered for the background and theme colors of the female group; the background color of the children can be Consider light colors, theme colors and accent colors. It is recommended to consider colors with high color brightness and saturation, which can activate the atmosphere of the space.

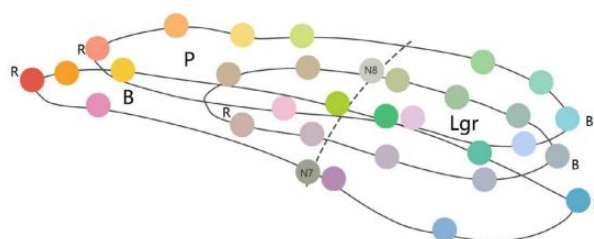


Figure 7. Reference color wheel for themed color design of the lounge.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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